

A telescope for rock mass density imaging based on muon TPC with Micromegas detector

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In the framework of the realization of field telescopes dedicated to the densitometry of geological objects, the choice of proportional detectors parallel plate type Micromegas was motivated by reasons of robustness, lightness and adaptability to various configurations of measurements. This choice was also driven for its intrinsic qualities:

- The rise and fall times of the pulse measured lower than 1 ns is sufficiently rapid to allow determining the direction (azimuths and zeniths) of muons by temporal discrimination,
- The ability to build compact detectors, dedicated to karst galleries and small section tunnels since only one detector is required to measure the direction of the muons,
- The stability of the gain, adjustable from 1 to about 100000,
- The printed circuit technique that allows facilitating future developments and applications.

We present the progress of the project T2DM2 (Temporal Tomography of Density by Muons flux Measurements) developed jointly by GEOAZUR, CPPM, CEA/IRFU and CERN/RD51 within the LSBB underground lab test site (<http://www.lsbb.eu>). The goal is to reach accuracy of the muon flux measurement required to characterize the temporal variations of the density associated with the water transfer accross the unsaturated zone of the main european karstic aquifer for depth ranging from 10 m to 500 m. The expected changes are greater than 3